No

3. Is the MVT hypothesis satisfied?

$f(x) = x^{\frac{1}{3}}$ on $[-1,1]$

if f cont on $[a,b]$ yes

diff on (a,b) no

$f'(x) = \frac{1}{3}x^{-2/3} = \frac{1}{3\sqrt[3]{x^2}}$ undefined if $x=0$

Oct 10-9:29 AM

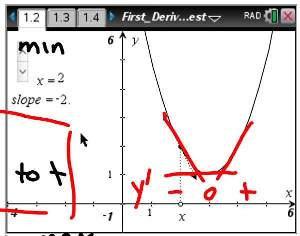
4.3 Connecting f ' and f '' with the graph of f

first derivative test for local extrema of continuous functions

y' − o + y has a min

− * +

y has a min if y' changes from − to +



y' + o − y has a max

+ * −

y has a max if y' changes from + to −

Oct 18-5:28 PM

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find the local extrema:

y=(x^2 - 3) e^x $= (x^2-3)e^x$

$y' = 2xe^x + e^x(x^2-3) = 0$

$y' = e^x(2x+x^2-3) = e^x(x^2+2x-3) = 0$

$y' = e^x(x+3)(x-1) = 0 \qquad x = -3, 1$

sign graph y' + 0 − 0 + (-3, 1)

max at $x=-3$ because y' changes from + to −

max is $y = 6e^{-3}$

min at $x=1$ because y' changes from − to +

min is $y = -2e$

Oct 18-6:24 PM

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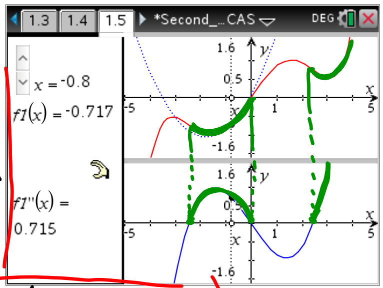
concavity test

y concave up $y''>0$

y concave down $y''<0$



y inflection point when y'' changes sign

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Find all points of inflection for the graph of $y = e^{-x^2}$

$y' = (-2x)e^{-x^2}$

$y'' = (-2x)(-2x)e^{-x^2} + e^{-x^2}(-2) = 0$

$y'' = e^{-x^2}(4x^2-2) = 0 \qquad x = \pm\sqrt{\frac{1}{2}}$

y'' + o − o + ($-\sqrt{\frac{1}{2}}$, $\sqrt{\frac{1}{2}}$)

infl. pts at $x = \pm\sqrt{\frac{1}{2}}$

$y = e^{\mp 1/2}$

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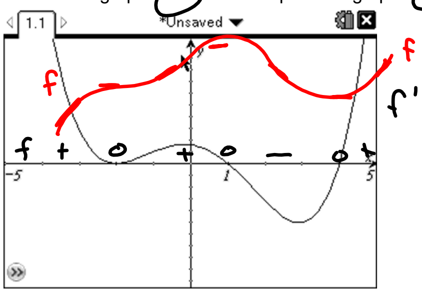
This is the graph of f '. Sketch a possible graph of f



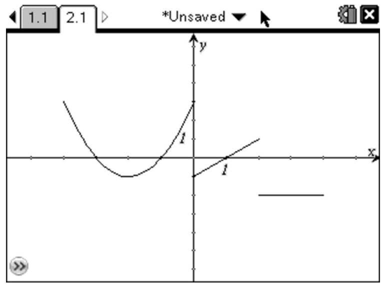
Oct 18-6:28 PM

second derivative test for local extrema

Find the local extrema using the second derivative test
y=x^3 -12x - 5

Oct 18-6:34 PM

Given the graph of f ' sketch a possible graph of f



Oct 18-6:41 PM

Oct 9-9:11 AM